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Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
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	)	
Advanced Television Systems	)	**MM Docket**
and Their Impact on the	)	**No. 87-268**
Existing Television Broadcast Service	)	
Review of Technical and	)	
Operation Requirements	)	
Part 73-E Television	)	
Broadcast Stations	)	
Reevaluation of the UHF Television	)	
Channel and Distance Separation	)	
Requirements of Part 73 of the	)	
Commission's Rules	)	

COMMENTS OF NYIT - TO THE TENTATIVE DECISION
AND FURTHER NOTICE OF INQUIRY ---

Submitted by:

New York Institute of Technology
Science and Technology Research Center
8000 North Ocean Drive
Dania, Florida 33004
(305) 923-0551

William E. Glenn, Ph.D.
Director

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Summary

The New York Institute of Technology has been engaged in the basic research and advanced development of television technologies since 1981. Foremost among these developments is the HDTV transmission system, VISTA.[1] We believe that the terrestrial broadcast industry should be capable of competing in quality with other HDTV television delivery media. Given the conclusions provided in the FCC's Tentative Decision and Further NOI, the VISTA system provides the greatest opportunity for a true HDTV quality distribution system for the terrestrial broadcasters.

1. This system is alternately referred to as the NYIT or Glenn system.

I. HDTV versus ATV Considerations

The FCC's Tentative Decision and Further Notice of Inquiry addresses many pertinent issues. In the overview, however, is the underlying question of how the terrestrial broadcasters can provide, full quality HDTV broadcasts in a fair and economical way. Since full HDTV quality VCR's and video disks have already been developed, and other distribution media (cable, fiber optic, and DBS) are rapidly being addressed in both Japan and Europe, it is imperative that the terrestrial broadcasters, and the public they serve, have competitive quality available. We will use HDTV as defined by the Commission, throughout this discussion, in lieu of ATV, for we feel that HDTV distribution should be the immediate goal and focus of the terrestrial broadcaster.

Evolution or a series of standards, such as an initial ATV distribution with improvements to full HDTV, would place an enormous economic burden on producers, broadcasters, and in particular, the public. Economies of scale will only become available if the public senses a firm direction towards a unified standard for all the video distribution modalities. A public which is confused or hesitant because of multiple standards or potential changes in standards, will impede the serious introduction of HDTV in the United States. Producers and broadcasters, in turn, must be confident that the public will purchase HDTV receivers, in order to make the necessary investments. They must also feel comfortable that their

investments will not have to be duplicated in the immediate future by the advent of another standard. A well-devised plan that will ensure that the terrestrial broadcasters have the ability to provide competitive HDTV service, is essential.

Obviously, the terrestrial broadcasters are prevented from addressing full HDTV within a single 6 Mhz channel by spectrum limitations. Although this issue will be discussed subsequently, based on preliminary findings, it appears that there is sufficient spectrum available in the existing UHF and VHF allocations to provide augmentation to full HDTV quality for all the broadcasters, if the NYIT VISTA system is adopted.

II. Receiver Considerations

The concept of an "open architecture" receiver has been suggested; one which will have sufficient intelligence by means of computer processing, to automatically select and process a host of different standards and display formats. We believe that this approach is misdirected and places too much complexity on the receiver, resulting in additional unnecessary cost to the consumer.

Although the FCC is not directly involved in establishing a standard for high-definition monitors, many of its decisions regarding the broadcast of HDTV will have an impact on the technical design and cost of future monitor and receiver configurations.

HDTV receiver electronics should be designed to provide a fixed format video signal to a display device (monitor) which will be of the highest quality possible. In the future, large screen displays will be primarily solid-state devices with active-matrix addressing, rather than the more flexible CRT's. Solid-state displays inherently have fixed formats since they are generated from photo-etched patterns. They will not be capable of adapting to a variety of scan formats. Consequently, a common display standard, i.e., aspect ratio, scan format, (progressive or interlace), and resolution (number of pixels), etc., should be adopted. Once a high-definition display format is defined and standardized, the receiver electronics can provide, by scan conversion, the necessary standardized format

signals to the display device. Decoders (including NTSC) and scan convertors, may be either an integral part of the monitor, separate units, or possibly PC boards that plug into the monitor. By way of analogy, consider the evolution of high fidelity audio systems (amplifiers, speakers, tape recorder, CD player). A host of input devices, bought from a variety of manufacturers, can be plugged into a common power amplifier and speaker system. Similarly, a number of video inputs may be connected to one HDTV display device.

The display must be in the format with the largest number of lines that is likely to be used in the United States. Although 1250 and 1350 lines have been considered in 50 Hz countries, it is anticipated that 1125 lines is the highest number of lines anticipated in 60 Hz countries. While the commission is not primarily concerned with trade issues, it should be pointed out that the choice of a display format other than 1125 lines would prevent export of receivers made in the United States to Japan. It would not, however, prevent import of Japanese sets to the United States.

III. Standards Considerations

There is considerable effort in the United States to develop techniques to allow ATV or HDTV to be transmitted compatibly with NTSC terrestrial broadcasts. These independent efforts, even if taken cumulatively, pale in comparison to the funding support of the Japanese and European efforts. It is interesting to note that both the Japanese and European efforts are directed at providing full HDTV capability. Furthermore, each of these coordinated efforts is intended to support its respective consumer-electronics base. Both efforts have strong governmental financial backing.

It seems that the present situation in the United States fosters a competitive, rather than a cohesive coordinated effort. In the United States, testing facilities, test procedures, and evaluation committees are being set up in an attempt to evaluate the merits of the various proposed systems. Even the idea of having "proponents" connotes a contest, wherein the winner takes all. Is this the best approach? Does competition necessarily result in the best system, and will it best serve the interests of the American public? The only organizations with enough financial support to enter such a competition effectively, are the foreign-owned set manufacturers.

Some committee members, however, appear to be addressing the issue on the basis of evaluating the best aspects of the various technological proposals from which a transmission standard or guidelines could be established. The financial resources

required for each proponent to develop a full system for comparative testing on a timely basis is, in most cases, not available to United States participants. This suggests that the possibility that an HDTV transmission standard will not necessarily result from the best technology available. Is this truly in the long-term best interests of the United States consumer? The potential profit from HDTV results primarily from the sale of receivers, regardless of the standard chosen. Today's lack of United States manufacturers in the consumer electronics industry eliminates the financial support needed to expedite the development efforts directed to the needs of the American consumer. Promoting cooperation rather than strict competition among the various proponents may, in the long run, provide the most technically sound approach to HDTV broadcasting. Indeed, agreement on the present NTSC standard was eventually established through a cooperative process. We would encourage the FCC to find ways to stimulate cooperation among proponents for establishing standards based on the best technology; not a de-facto, standard based on financial resources.

A. HDTV Standards

We agree with the Commission's judgment that it is too early to adopt a transmission standard. We believe that the FCC should be establishing strict guidelines and minimum performance levels for HDTV transmission that control the interference criteria for stations, rather than a rigid total specification or standard. New protection ratios will need to be established for special

HDTV augmentation signals that are designed to produce little interference and to tolerate more interference. In essence, we recommend standards similar to NTSC wherein synchronizing levels, color carrier frequency and placement, etc., are set, but video characteristics are less restrictive. This approach is proposed not to allow multiple standards, but rather to allow future improvements to be implemented as the technology advances, without the need for new "standards".

Most likely other media such as cable, direct-broadcast satellite, and/or video cassettes, will initially distribute HDTV material to the United States public. They do not face the same constraints as do terrestrial broadcasters. Quite likely, the lack of a clear recommended guideline will confuse the broadcasters, producers, and set manufacturers. We would encourage the Commission to recommend standardized guidelines for HDTV terrestrial transmission.

B. NTSC Standards Considerations

We fully concur with the Commission's findings that NTSC service should be maintained, and that HDTV should be compatible with NTSC. HDTV is optimum for large-screen presentations, which will still leave many smaller NTSC receivers in operation in the home for many years. In fact, there will probably be a continuing demand for NTSC transmissions for small, inexpensive receivers almost indefinitely.

Improvements to NTSC transmission and reception have been demonstrated by several proponents. These improvements, in general, remove the several artifacts inherent in the basic NTSC system. The Commission should consider relaxation of the NTSC standards, if changes could improve image quality. However, any relaxation in the standard should not adversely effect existing NTSC receiver performance. Minimum performance levels should be applicable both to standard NTSC transmissions, as well as to the NTSC-compatible portion of an HDTV transmission that is received on an NTSC receiver.

IV. Spectrum Considerations

The ultimate goal is to ensure the terrestrial broadcasters a means for distributing an image having a quality that is competitive with full HDTV quality program material, distributed by other media. The decisions relating to spectrum allocation and interference criteria are the critical issues that determine the final competitive quality that the terrestrial broadcasters can achieve. We expect the spectrum studies being undertaken by the Commission and other groups to provide the technical information that will be necessary for making these decisions.

Preliminary findings suggest that NTSC service should be maintained. Only the available VHF and UHF spectrums should be made available for HDTV transmission without "repacking". The studies further suggest that to fully accommodate all of the existing stations with HDTV augmentation spectrum, would require establishing new interference criteria for these special signals, as well as the allocation of 3 or 6 MHz non-contiguous additional augmentation spectrum. These modifications would be needed, especially for HDTV broadcast, in the "top ten" markets. Of the various proposed HDTV transmission systems, NYIT's VISTA system is the only approach that satisfies these FCC criteria and also provides competitive HDTV quality broadcasts. VISTA's 3 or 6 MHz augmentation channel approach will provide both full resolution HDTV (700 to 800 lines on a test chart), and a wider aspect ratio while simultaneously providing uninterrupted NTSC transmission.

Several proponents have suggested that a separate ATV signal be simultaneously broadcast in a 6 MHz channel to supplement the 6 MHz NTSC broadcast, rather than providing an augmentation signal. This simulcast approach has been proposed on the theory that NTSC will no longer be required, and therefore additional spectrum will be available at a later date. It is our belief that NTSC, or improved NTSC, will be around for a long time since it provides more than adequate performance for small inexpensive receivers (19 inches or less). Therefore, it will provide a low-cost option for consumers for many years. Monochrome television receivers are still sold at reasonable prices even though color broadcasts have been available for thirty-five years.

Most important, however, is the fact that it has not been shown that full HDTV performance can be provided in a single 6 MHz channel, even if it is incompatible. SONY Corporation in their Reply Comments to the NOI stated;[1] "SONY is convinced that even the best of contemporary band-width reduction techniques cannot allow a representative HDTV picture portrayal via a single 6 MHz transmission channel. We believe a channel bandwidth in the neighborhood of 8 to 9 MHz will be required to properly transport a home viewer version of HDTV." In addition, NHK stated;[2] "It should be emphasized that any use of 6 MHz

1. Reply comments of SONY Corporation - January 19, 1988, page i.i..

2. Reply comments of NHK - The Japan Broadcasters Corporation - January 19, 1988, page 11.

transmission bandwidth places restrictions on picture quality improvement, and there is little expectation for development of bandwidth compression technology to use less than 6 MHz in the foreseeable future. Expansion of the current bandwidth (6 MHz) by a minimum of 3 MHz is thus considered the best to way to transmit high quality ATV".

We also believe a minimum of 8 to 9 MHz is required for high quality HDTV transmission, and that maintaining NTSC compatibility supports the augmentation-channel approach proposed by NYIT. No proposed transmission system has shown, even theoretically, that full HDTV performance can be provided in a single 6 MHz channel, compatible or not. In theory, the highest resolution attainable within a 6 MHz channel appears to be between 450 to 550 lines rather than the 700 to 800 lines necessary for full HDTV performance. To survive in the telecommunications marketplace, United States terrestrial broadcasters must be as competitive as possible with other distribution media, as early as possible. Providing marginal ATV performance, even for several years, in competition with HDTV quality performance from other distribution media will place the terrestrial broadcasters at an extreme economic disadvantage.

Furthermore, the ultimate cost to the consumer will be higher, if the transition to HDTV is made in two steps rather than one. An ATV receiver, purchased to receive a signal that improves resolution to 450-550 lines, will become obsolete when full-resolution HDTV is broadcast.